

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

ORIGINAL
RECEIVED
MAY -12 1994

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of	)	GEN Docket No. 90-314,
	)	RM-7140, RM-7175, RM-7618
Amendment of the Commission's	)	PP-6 through PP-10, PP-12,
Rules to Establish New Personal	)	PP-13, PP-15 through PP-20,
Communications Services	)	PP-26, PP-27, PP-41 through
	)	PP-52, PP-54 through PP-68,
	)	PP-70, PP-72 through PP-78

Reply Comments

of

QUALCOMM Incorporated

Kevin J. Kelley
Vice President, External Affairs
QUALCOMM Incorporated
1233 20th Street, N.W.
Suite 202
Washington, D.C. 20036
(202) 223-1720

Veronica M. Ahern
Albert Shuldiner
Nixon, Hargrave, Devans & Doyle
One Thomas Circle, N.W.
Suite 800
Washington, D.C. 20005
(202) 457-5300

May 2, 1994

No. of Copies rec'd 7049
List ABCDE

SUMMARY

The Omnipoint Opposition to QUALCOMM's Petition for Reconsideration fails to respond to the key criticisms made by QUALCOMM. Rather, Omnipoint attempts to mislead and confuse the Commission. QUALCOMM discusses herein these examples of Omnipoint's distortion of the record:

- The record does not support Omnipoint's claim that it changed its spread spectrum technology when it changed its carrier frequency;
- The record does not support Omnipoint's claim that its handsets can switch between licensed and unlicensed bands;
- The record does not contain any reliable test results of the Omnipoint system that demonstrate the technical feasibility of the system;
- The record does not support a finding that the Omnipoint system facilitated sharing with microwave users;
- The record does not support a finding that Omnipoint developed a PSTN compatible interface justifying a pioneer's preference;
- The record does not show that Omnipoint has demonstrated a feasible multiple access capability that is either novel or useful;
- The record does not support a finding that the PCS rules are a reasonable outgrowth of the Omnipoint proposal.

Finally, QUALCOMM shows that the *Third Report and Order* was procedurally defective in its reliance on an Omnipoint *ex parte* communication and that Omnipoint attempted to deceive the Commission as to the disposition of a QUALCOMM Motion to Strike that *ex parte* communication.

RECEIVED

MAY 12 1994

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of	)	GEN Docket No. 90-314,
	)	RM-7140, RM-7175, RM-7618
Amendment of the Commission's	)	PP-6 through PP-10, PP-12,
Rules to Establish New Personal	)	PP-13, PP-15 through PP-20,
Communications Services	)	PP-26, PP-27, PP-41 through
	)	PP-52, PP-54 through PP-68,
	)	PP-70, PP-72 through PP-78

REPLY

QUALCOMM Incorporated ("QUALCOMM"), by its attorneys, hereby responds to the April 21, 1994 Opposition ("Opposition")^{1/} of Omnipoint Communications, Inc. ("Omnipoint"), filed in reply to QUALCOMM's March 30, 1994 Petition for Reconsideration ("Petition") of the Federal Communications Commission's ("FCC" or "Commission") *Third Report and Order* in the above-captioned proceeding.^{2/} Omnipoint has failed entirely to respond to key criticisms made by QUALCOMM.^{3/} The Opposition should be denied and the QUALCOMM Petition granted.^{4/}

^{1/} The Opposition is replete with irrelevant and tangential attacks on QUALCOMM's pioneer's preference request. In view of the page limitation on reply comments, QUALCOMM will not respond to these irrelevancies.

^{2/} *Amendment of the Commission's Rules to Establish New Personal Communications Services*, GEN Docket No. 90-314 (Feb. 3, 1994), summarized at 59 Fed. Reg. 9419 (Feb. 28, 1994) ("*Third Report and Order*").

^{3/} Instead of addressing the issues raised in the Petition, Omnipoint resorts to hyperbole. This tactic is best evidenced by Omnipoint's repeated mischaracterization of the QUALCOMM Supplemental Comments as "illegal." The Supplemental Comments were in no way illegal. QUALCOMM complied with the Commission's rules by filing a Motion for Leave to File Supplemental Comments. Omnipoint's mischaracterization of QUALCOMM's actions is particularly ironic in light of Omnipoint's conduct in this proceeding, which conduct has resulted in numerous pending allegations that Omnipoint has violated the Commission's *ex parte* rules.

^{4/} Throughout the Opposition, Omnipoint relies on its August 11, 1993 Opposition to QUALCOMM's Motion for Leave to File Supplemental Comments. As Omnipoint is aware, the Commission did not grant QUALCOMM's Motion and did not include QUALCOMM's Supplemental Comments in the record. *Order*, DA 93-1055 (OET August 30, 1993). If the QUALCOMM Supplemental Comments and Motion are not part of the record, then there is no reason to include the Omnipoint Opposition. Consequently, all references to these pleadings should be stricken from the record.

I. THE RECORD DOES NOT SUPPORT OMNIPPOINT

In its Petition, QUALCOMM found that the record in this proceeding does not support award of a pioneer's preference to Omnipoint based on the criteria established by the Commission in the *Third Report and Order*. Omnipoint vainly attempts to confuse and mislead the Commission, but a close reading of the record supports QUALCOMM.

A. Technological Development. In its Petition, QUALCOMM questioned whether the "developments" relied upon by the Commission were sufficient to warrant a pioneer's preference.^{5/} QUALCOMM believes that it is not innovative to simply shift RF frequencies, yet there is nothing in the record to show that "Omnipoint changed any aspect of its spread spectrum technology when it changed the carrier frequency of its equipment."^{6/} Omnipoint's Opposition maintains that its "system for 2 GHz PCS is significantly different from its earlier 901-928 MHz developments," and that this is detailed in Omnipoint's Experimental Report of April 1992.^{7/}

According to the FCC's records, there is no April 1992 Omnipoint Experimental Report. There is, however, a May 1992 Report, and far from confirming Omnipoint's assertion, the May Report contradicts it. In that Report, Omnipoint said that PCS service providers could begin deploying their systems in the ISM bands and then, "simply replace the RF modules in their Omnipoint equipment to operate at whatever frequencies are allocated by the FCC."^{8/} In other words, only the frequency would change; everything else would remain the same.

^{5/} Those "developments" were concentrated in three areas: (1) radio frequency engineering and spread spectrum product design; (2) coexistence with other users of the same frequencies; and (3) compatibility with the PSTN. Petition at 9; *Third Report and Order* at ¶ 55.

^{6/} Petition at 10.

^{7/} Opposition at 4.

^{8/} Omnipoint Semi-Annual Experimental License Report - Call Sign KF2XEH, File No. 1629-E-PL-90 at 3-4 (May 1992). This is only the first example of Omnipoint's intentional misrepresentation of the record, including distortion, miscitation and misquotation of Omnipoint's and other parties' filings. Omnipoint's credibility in this proceeding and its failure to respect the Commission's rules and procedures are important issues which can no longer be ignored.

The Petition also questioned the Commission's conclusion that the Omnipoint handsets can switch between licensed and unlicensed frequencies.^{9/} In the Opposition, Omnipoint tries to obfuscate this issue by citing various experimental reports.^{10/} In fact, not one of the reports cited by Omnipoint contains any evidence that Omnipoint demonstrated equipment that was capable of operating in both the licensed and unlicensed bands. For example, in a report cited by Omnipoint, Cox describes the pocket handsets as being frequency agile, in the 1850-1990 MHz band.^{11/} No mention is made of frequency agility between licensed and unlicensed bands.

B. Technical Feasibility. The record in this proceeding does not demonstrate the feasibility of Omnipoint's proposed 1800 MHz system. But before turning directly to that issue, it may be helpful to recall what the record does contain. In its June 1992 Reply Comments, Omnipoint told the Commission that it had, "operational, spread spectrum, pocket phones and wireless systems operating in the 1850-2200 MHz band that incorporate the critical system features discussed in our Pioneers Preference."^{12/} Omnipoint emphasized this point "because there are huge differences between a) principles of operation that can only be modeled and simulated; b) what can be demonstrated in a prototype that has no constraints on size, power consumption, cost or mass producibility, and c) what can be achieved in a handheld RF product."^{13/} Finally it stated "we believe we have the only PCS system that will be commercially fielded this year."^{14/} QUALCOMM believes that a fair reading of these statements is that Omnipoint was claiming in June 1992 that it had a commercial, or at least very near commercial, 1800 MHz PCS system available.

^{9/} *Third Report and Order* at ¶ 74.; See Petition at 10.

^{10/} Opposition at n.4.

^{11/} Cox Enterprises, Inc. Seventh Quarterly Progress Report at 5 (November 22, 1992).

^{12/} Omnipoint Reply Comments, GEN Docket No. 90-314 at 3 (June 26, 1992) (emphasis added).

^{13/} *Id.* (emphasis added).

^{14/} *Id.* at 4 (emphasis added).

In its *Tentative Decision* and its *Third Report and Order*, the Commission relied upon Omnipoint's claims of an operational system and upon "evidence" provided by other entities.^{15/} In its Petition, QUALCOMM concluded that the reports of the identified entities, when examined closely, do not support the Commission's finding that Omnipoint had demonstrated the feasibility of its 1800 MHz PCS system. Nothing in Omnipoint's Opposition disturbs that conclusion.

1. **American Portable Telecommunications (APT)**. Both Omnipoint and the Commission cite APT as one of the entities whose experimental work supports the Commission's finding that Omnipoint had demonstrated the technical feasibility of its 1800 PCS system. In its Opposition, Omnipoint admits that it sold APT 900 MHz equipment. It does not say that APT purchased any 2 GHz equipment. It admits that all that was ever tested was a prototype. It does not remind the Commission that, as it said in June 1992, there are "huge differences" between a prototype and a handheld RF product. Most importantly, Omnipoint does not cite a single test result from an APT test of Omnipoint's 1800 MHz PCS equipment. What did the Commission rely upon to support a finding of technical feasibility? Omnipoint does not tell us; neither does the Commission.

2. **Ameritech**. Ameritech first mentioned Omnipoint in its fourth progress report filed on February 28, 1992. In that report, it stated that it had "commissioned Omnipoint Corporation to develop handset/base station equipment using CDMA (code division multiple access) technology compatible with its trial objectives."^{16/} Throughout its following progress reports, Ameritech continues to refer to Omnipoint equipment, but, despite telling the Commission in January of 1993 that it was planning "comprehensive testing in the first quarter of 1993", Ameritech has never submitted the results of a single experiment that demonstrates the technical feasibility of the features for which the Commission awarded Omnipoint a

^{15/} *Amendment of the Commission's Rules to Establish New Personal Communications Services*, 7 FCC Rcd 7794 at ¶ 20 (1992); *Third Report and Order* at ¶ 67.

^{16/} Ameritech Direct Communications, Inc. Fourth Progress Report at 4 (February 28, 1992).

preference.^{17/}

In its Opposition, Omnipoint says that "Ameritech's experimental reports and press releases clearly stated that it was conducting two trials with two vendors,"^{18/} Motorola and Omnipoint. In support, Omnipoint cites three Ameritech Experimental Reports. Contrary to the plain language of the Opposition, the first two of these describe planned tests, not tests Ameritech "was conducting."^{19/} In its Fifth Progress Report, Ameritech reported to the Commission that it had, "observed a demonstration of prototype CDMA equipment from Omnipoint."^{20/} Omnipoint described the equipment it demonstrated at Ameritech Corporate Headquarters on March 30, 1992, as a "prototype" of a "full duplex cordless phone system."^{21/} The Ameritech demonstration involved a single base station and QUALCOMM believes, a single handset. A review of the record indicates that there was no demonstration of CDMA capability, no demonstration of frequency reuse, no demonstration of hand off capability, and no demonstration of video or data capability. QUALCOMM believes the Commission should require more than the operation of a simple cordless phone system at 1800 MHz to justify the award of a pioneer's preference that will cost the American taxpayers hundreds of millions of dollars.

3. **Cox.** The Opposition cites a Cox Report for the proposition that a solution had been found for the troublesome "over-the-air TDD issue."^{22/} However, the Opposition fails to explain that the solution is "essentially to convert the off-air TDD format to FDD for cable transportation."^{23/} In other words, a

^{17/} See Ameritech Direct Communications, Inc. Progress Reports dated: May 29, 1994; September 4, 1992; January 6, 1993; and April 13, 1993.

^{18/} Opposition at 7.

^{19/} Ameritech Direct Communications, Inc. Third Progress Report (November 22, 1991) Fourth Progress Report (February 28, 1992).

^{20/} Ameritech Direct Communications, Inc., Fifth Progress Report (May 29, 1992) (emphasis added).

^{21/} Omnipoint Corporation Semi-annual Experimental License Report No. KF2XEH, File No. 1629-EX-PL-90 at 3-12 (May 1992) (emphasis added).

^{22/} Opposition at 8-9.

^{23/} Cox Enterprises, Inc. Tenth Quarterly Progress Report at 8 (August 20, 1993).

modification of a fundamental element of the Omnipoint system was necessary to get it to work. This is hardly evidence of the technical feasibility of the system for which the Commission awarded a preference.

4. Southwestern Bell Personal Communications ("SBPC"). Omnipoint claims that the SBPC test of its equipment, even though short in duration, generated "enormous amounts of data."^{24/} For whatever reasons, those enormous amounts of data are not included in the record of this proceeding. A meager four pages, including diagrams, is devoted to this extensive experiment. Further, this was no test of the Omnipoint equipment; it was, as SBPC states, a test "to demonstrate that IMASS enables spectrum sharing between PCN and incumbent microwave users."^{25/} It is unreasonable for the Commission on the one hand to conclude that IMASS has not been demonstrated to be feasible and, on the other hand, to use the IMASS test to support the feasibility of Omnipoint's system.^{26/}

(b) Frequency Sharing. In its Petition, QUALCOMM noted that it had previously questioned the Commission's findings that Omnipoint's system facilitated sharing with microwave users. QUALCOMM asked the Commission to reconsider its reliance on Omnipoint's assertions that tests conducted with SBPC disprove QUALCOMM's criticisms.^{27/} As mentioned above, the purpose of the SBPC interference test was to analyze the accuracy of SBPC's IMASS interference avoidance system. The fact that it incorrectly predicted the amount of interference that would be produced by the Omnipoint system says nothing about the spectrum sharing capabilities of Omnipoint's equipment. As Ameritech noted in its Seventh Progress Report, "[t]he PCS handset will be a significant component in studying the interference potential PCS has on existing microwave."^{28/} QUALCOMM does not understand how Omnipoint can

^{24/} Opposition at 10.

^{25/} Southwestern Bell Personal Communications Third Quarterly Progress Report at 1-1 (December 17, 1992).

^{26/} See *Third Report and Order* at ¶ 138.

^{27/} Petition at 15.

^{28/} Ameritech Direct Communications, Inc. Seventh Progress Report at Appendix B, 2 (January 6, 1993).

claim that SBPC tests demonstrated the spectrum sharing capability of its equipment when, during the critical phase of the test, there were no mobile units on the air.

Omnipoint's argument concerning the "Bob Dixon Box" is similarly deficient. In yet another example of Omnipoint's expectation that the Commission will simply accept its assertions, Omnipoint states that "those signals were replications of the relevant . . . parameters"^{29/} but fails to elaborate. Omnipoint also states that "Omnipoint's actual PCS systems were also tested" but fails to provide details of those tests. The fact of the matter is that the Bob Dixon Box does not replicate the most relevant parameter of the Omnipoint system for spectrum sharing purposes: its pulsed nature. Consequently, it cannot serve as a substitute for Omnipoint's actual system, and Omnipoint's tests using the Bob Dixon Box cannot be used to conclude that Omnipoint has demonstrated an ability to share spectrum.

Omnipoint's response to APT's reported interference to a wireless 902-928 MHz LAN demonstrates Omnipoint's attempts to misconstrue QUALCOMM's criticisms. Although QUALCOMM is aware that the APT test occurred in the ISM bands and not at 2 GHz, these APT tests are a valid indication of the problems with the pulsed nature of the Omnipoint PCS system signal. The inability of a pulsed system to co-exist with other systems in the same band is true without regard to the actual operating frequency.^{30/}

(c) **PSTN Compatibility.** The record contains no evidence that Omnipoint has demonstrated an innovative interface between its base station and the PSTN despite the Commission's reliance on this supposed development.^{31/} Omnipoint's Opposition provides no citations to support a blanket statement that Omnipoint and Ameritech have reported a unique approach to interconnection. Omnipoint's

^{29/} Opposition at 11 (emphasis added).

^{30/} Omnipoint, rather than addressing the merits of QUALCOMM's claims, sneers at QUALCOMM's citation to a recent New Zealand study on this issue. Contrary to Omnipoint's irrational comments, this report was presented as a full scientific report -- not an "anecdotal newspaper report." Moreover, this report merely summarizes in an easy-to-read fashion similar results reported in numerous studies. See Petition at 16-17 n.57.

^{31/} Third Report and Order at ¶ 55.

quotation of Ameritech's Petition for Reconsideration does not support its claims. Omnipoint neglects to include the sentence which clarified that, "Ameritech is in fact the party responsible for developing and implementing the PSTN side of this base station interface."^{32/} Even Omnipoint must recognize that Ameritech's statement undercuts any claim that Omnipoint created a PSTN interface sufficient to warrant grant of a preference.

(d) Multiple Access/Frequency Reuse. First, Omnipoint's claim that, "every test involving more than one Omnipoint 2 GHz base station demonstrated the TDMA/CDMA/FDMA capabilities because that is how the system is always configured", is ludicrous. How can the operation of a single mobile unit demonstrate that more than one user can operate on the same (or different) cell(s) at the same time? Second, regarding the statements of the Omnipoint consultant, LCC, it reported that while operating with a single base station Omnipoint completed a "pocket phone to pocket phone" call.^{33/} There is no indication in the record what multiple access method was used. However, because the Omnipoint system is a TDMA system, it was most likely that each user was assigned a separate time slot. This represents simple TDMA with two mobiles, just as QUALCOMM said in its Petition.

Finally, as far as Omnipoint's claim that QUALCOMM is redefining terms, just the opposite is true. QUALCOMM used the seminal article on cellular radio from the Bell System Technical Journal, one of the world's most respected telecommunications journals, as the source for its definition of frequency reuse. The simple fact is that, according to that definition, Omnipoint cannot, and did not, demonstrate frequency reuse with the operation of a single mobile.

(e) Reasonable Outgrowth. Omnipoint's response to QUALCOMM's demonstration that the PCS rules adopted by the Commission were not a reasonable outgrowth of the Omnipoint proposal is another example of its continuing attempt to distort the record in this proceeding and mislead the Commission.

^{32/} Ameritech Direct Communications, Inc. Petition for Reconsideration at 5 (March 25, 1994).

^{33/} Omnipoint Reply Comments at LCC Appendix, 5 (March 1, 1993).

Omnipoint states, "[t]here are many references to Omnipoint's tests of 5 MHz to 10 MHz bandwidths", and then it cites two experimental reports.^{34/} In the first cited report, Omnipoint states, "[A]lthough we have explored bandwidths of 5 MHz to 40 MHz, we have chosen to implement initial systems with either 9 MHz to 25 MHz depending on the application."^{35/} In the second cited report, Omnipoint again states that it has "explored bandwidths between 5 MHz and 10 MHz" and does an analysis of what it claims is the "lower bound of the bandwidth of the configurations tested."^{36/} Neither of these reports identifies a test. Omnipoint cannot cite to an actual test of anything other than 10 MHz equipment because the record clearly shows that the Omnipoint equipment has a 10 MHz bandwidth.^{37/}

After trying to mislead the Commission about the bandwidth of its equipment, Omnipoint then states that QUALCOMM's claim that the Omnipoint system is unsuited for the Commission's 20 and 30 MHz allocations is false. Omnipoint offers no support for its statement. QUALCOMM will say it again; Omnipoint's 10 MHz system and its preferred N=3 frequency reuse pattern are incompatible with the Commission's PCS spectrum allocation.

II. THE THIRD REPORT AND ORDER WAS PROCEDURALLY DEFECTIVE

QUALCOMM will not recite again the numerous errors contained in the *Third Report and Order*. However, the Commission must respond to QUALCOMM's assertion that the Commission impermissibly relied upon an *ex parte* communication when it cited Omnipoint's August 1993 Semi-Annual Experimental License Report ("Experimental Report") to support its findings in connection with its grant

^{34/} Opposition at 17.

^{35/} Omnipoint Corporation Semi-annual Experimental License Report - Call Sign KF2XEH, File No. 1629-EX-PL-90 at Section 4.2.1, 4-3 (May 1992) (emphasis added)..

^{36/} Omnipoint Corporation, Semi-annual Experimental License Report - Call Sign KKXCV, File No. 2174-EX-PL-91 at 7 (August 1993) (emphasis added).

^{37/} See, e.g., Cox Seventh Progress Report at Attachment B, 4 (December 1992) (10 MHz RF channel); Southwestern Bell Personal Communications, Inc. Third Quarterly Progress Report at 1-4 (December 17, 1992) (each DS-1900 user is assigned a 10 MHz TDMA channel).

of a pioneer's preference to Omnipoint.^{38/}


Omnipoint responds that the Commission has denied the substance of QUALCOMM's arguments in connection with the Experimental Report.^{39/} Omnipoint's response is simply wrong. QUALCOMM filed its Motion to Strike Omnipoint's Experimental Report on September 15, 1993; therefore, it would have been impossible for the Commission to have responded to QUALCOMM's Motion on August 30, 1993 as Omnipoint contends. Omnipoint's misuse of this Commission citation in this context is deceptive and should not be tolerated.

CONCLUSION

For the foregoing reasons, the Commission should deny Omnipoint's Opposition and grant QUALCOMM's Petition for Reconsideration of the *Third Report and Order*.

Respectfully submitted,

QUALCOMM Incorporated

By: 
Veronica M. Ahern
Albert Shuldiner

Kevin J. Kelley
Vice President, External Affairs
QUALCOMM Incorporated
1233 20th Street, N.W.
Suite 202
Washington, D.C. 20036
(202) 223-1720

Nixon, Hargrave, Devans & Doyle
One Thomas Circle, N.W.
Suite 800
Washington, D.C. 20005
(202) 457-5300

May 2, 1994

Its Attorneys

^{38/} See *Third Report and Order* at ¶ 56 and n.68.

^{39/} Opposition at 21, citing *Order*, DA 93-1055 (OET August 30, 1993).

CERTIFICATE OF SERVICE

I, Albert Shuldiner, hereby certify that copies of the foregoing Reply of QUALCOMM Incorporated were served via first-class, postage-prepaid mail, or by hand delivery where indicated by an asterisk (*), on this 2nd day of May, 1994, to the parties listed below.

Chairman Reed Hundt*
Federal Communications Commission
1919 M Street, N.W., Room 814
Washington, D.C. 20554

Commissioner James H. Quello*
Federal Communications Commission
1919 M Street, N.W., Room 802
Washington, D.C. 20554

Commissioner Andrew C. Barrett*
Federal Communications Commission
1919 M Street, N.W., Room 844
Washington, D.C. 20554

A. Richard Metzger, Jr.*
Acting Chief
Common Carrier Bureau
Federal Communications Commission
1919 M Street, N.W., Room 500
Washington, D.C. 20554

Dr. Thomas P. Stanley*
Chief Engineer
Federal Communications Commission
2025 M Street, N.W., Room 7002
Washington, D.C. 20554

H. Stuart F. Feldstein, Esq.
Richard Rubin, Esq.
Associated PCN Company
c/o Fleischman and Walsh
1400 16th Street, N.W.
Washington, D.C. 20036

Randall D. Fisher, Esq.
Daniel V. Liberatore, P.E.
Adelphia Communications Corp.
5 West Third Street
Coudersport, PA 16915

William Kennard*
Office of General Counsel
Federal Communications Commission
1919 M Street, N.W., Room 614
Washington, D.C. 20554

Mr. Harold C. Davis
Chief Technical Officer
Advanced MobileComm
Technologies, Inc.
82 Devonshire Street, R25D
Boston, MA 02109

Francine J. Berry, Esq.
David P. Condit, Esq.
Seth S. Gross, Esq.
295 North Maple Avenue, Room 3244J1
Basking Ridge, New Jersey 07920

Mr. Robert Ross Gray
American TeleZone
13103 N. Moss Creek
Cypress, Texas 77429

JoAnne G. Bloom, Esq.
Robert Reiland, Esq.
Ameritech
30 South Wacker Drive, Suite 3900
Chicago, Illinois 60606

Mark S. Fowler, Esq.
James H. Barker, Esq.
Bell Atlantic Personal Communications, Inc.
c/o Latham & Watkins
1001 Pennsylvania Avenue, N.W., Suite 1300
Washington, D.C. 20004

Dennis F. Begley, Esq.
Broadband Communications Corporation
1818 N Street, N.W., Suite T20
Washington, D.C. 20036

James F. Ireland, Esq.
Cable USA, Inc.
c/o Cole, Raywid & Braverman
1919 Pennsylvania Avenue, N.W.
Washington, D.C. 20006-3458

Peter Casciato, Esq.
Cellular Service, Inc.
c/o Law Offices of Peter Casciato
Roundhouse Plaza
1500 Sansome Street, Suite 201
San Francisco, CA 94111

Judith St. Ledger-Roty, Esq.
W. Theodore Pierson, Jr., Esq.
Nancy J. Thompson, Esq.
Cellular Service, Inc.
c/o Reed Smith Shaw & McClay
1200 18th Street, N.W.
Washington, D.C. 20036

Mr. John D. Lockton
Managing Partner
Corporate Technology Partners
520 S. El Camino Real
San Mateo, CA 94010

Werner Hartenberger, Esq.
Jonathan M. Levy, Esq.
Laura Phillips, Esq.
Cox Enterprises, Inc.
c/o Dow, Lohnes & Albertson
1255 23rd Street, N.W., Suite 500
Washington, D.C. 20037

David C. Jatlow, Esq.
Ericsson Business Communications, Inc.
c/o Young & Jatlow
2300 N Street, N.W., Suite 600
Washington, D.C. 20037

Harold Mordkofsky, Esq.
Robert M. Jackson, Esq.
Freeman Engineering Associates, Inc.
c/o Blooston, Mordkofsky, Jackson
& Dickens
2120 L Street, N.W.
Washington, D.C. 20037

Mark Tauber
Ronald L. Plessner
Mark J. O'Connor
Piper & Marbury
1200 19th Street, N.W., Suite 700
Washington, D.C. 20036

James U. Troup, Esq.
Iowa Network Services, Inc.
Arter & Hadden
1801 K Street, N.W., Suite 400K
Washington, D.C. 20006

Douglas G. Smith
President
Omnipoint Communications
7150 Campus Drive
Colorado Springs, Colorado 80920

Mr. Tom Alberg
Executive Vice-President
McCaw Cellular Communications
5400 Carillon Point
Kirkland, Washington 98033

Mr. Richard Brass
President
Oracle Data Publishing, Inc.
500 108th Avenue, N.E., Suite 1750
Bellvue, WA 98004-5500

Stuart F. Feldstein, Esq.
Omnipoint Mobile Data Co.
c/o Fleischman and Walsh
1400 Sixteenth Street, N.W.
Washington, D.C. 20036

James P. Tuthill, Esq.
Betsy Stover Granger
Pacific Bell
140 New Montgomery Street, Room 1525
San Francisco, California 94105

James L. Wurtz, Esq.
Pacific Bell
1275 Pennsylvania Avenue, N.W.
Washington, D.C. 20004

Carl W. Northrop, Esq.
Bryan Cave
Pactel Corporation
700 13th Street, N.W.
Washington, D.C. 20005

Mark A. Stachiw, Esq.
PacTel Corporation
1221 Merit Drive, Suite 800
Dallas, Texas 75251

Jeffrey Blumenfeld, Esq.
Charon J. Harris, Esq.
Glenn B. Manishin, Esq.
PageMart, Inc.
c/o Blumenfeld & Cohen
1615 M Street, N.W., Suite 700
Washington, D.C. 20036

Caressa D. Bennet, Esq.
Panhandle Telephone
c/o Blooston, Mordkofsky, Jackson
& Dickens
2120 L Street, N.W.
Washington, D.C. 20037

Mr. Richard G. Tomlinson
PCN Communications, Inc.
2906 Main Street
Glastonbury, Connecticut 06033

A. Thomas Carroccio, Esq.
Pulson Communications Corp.
c/o Santarelli, Smith & Carroccio
1155 Connecticut Avenue, N.W.
Washington, D.C. 20036-4308

Peter Tannenwald, Esq.
Radio Telecom and Technology, Inc.
c/o Arent, Fox, Kintner, Plotkin
& Kahn
1050 Connecticut Avenue, N.W.
Washington, D.C. 20036-5339

James F. Ireland, Esq.
SATCOM, Inc.
c/o Cole, Raywid & Braverman
1919 Pennsylvania Avenue, N.W.
Washington, D.C. 20006-3458

James F. Ireland, Esq.
TeleCable Corporation
c/o Cole, Raywid & Braverman
1919 Pennsylvania Avenue, N.W.
Washington, D.C. 20006-3458

Frederick M. Joyce, Esq.
Christine McLaughlin, Esq.
LDH International, Inc.
Goeken Custom Communications, Inc.
2300 M Street, N.W., 8th Floor
Washington, D.C. 20037

David J. Kaufman, Esq.
Greenline, Inc.
c/o Brown, Finn & Nietert, Chartered
1920 N Street, N.W., Suite 660
Washington, D.C. 20036

Albert H. Kramer, Esq.
Tele-Financing Corp. Inc.
Keck, Mahin & Cate
1201 New York Avenue, N.W.
Washington, D.C. 20005-3919

Randall B. Lowe, Esq.
John E. Hoover, Esq.
Litel Telecommunications Corp.
c/o Jones, Day, Reavis & Pogue
1450 G Street, N.W.
Washington, D.C. 20005-2088

Mr. Bernard C. Nelson
President
Cerberus Consulting Corp.
35 Toni Drive
Englewood Cliffs, New Jersey 07632

J. Bradford Shiley, Esq.
Pathfinder Ventures, Inc.
4640 S.W. Macadam, Suite 270
Portland, OR 97201

Paul J. Sinderbrand, Esq.
Dawn G. Alexander, Esq.
Sinderbrand & Alexander
888 16th Street, N.W., Suite 610
Washington, D.C. 20006

Thomas E. Taylor, Esq.
James F. Lummanick, Esq.
Lisa A. Thornton, Esq.
Cincinnati Bell Telephone Co.
c/o Frost & Jacobs
2500 Central Trust Center
201 East Fifth Street
Cincinnati, Ohio 45202

Donald L. Schilling
President
SCS Mobilcom, Inc.
85 Old Shore Road, Suite 200
Port Washington, New York 11050

Mr. Sanjay B. Moghe
President
SM Tek, Inc.
1021 Warwick Circle
Hoffman Estates, Illinois 60194

Victor J. Toth, Esq.
SM Tek, Inc.
c/o Law Offices of Victor J. Toth
2719 Soapstone Drive
Reston, Virginia 22091

Mr. J. Daniel Bariault
President
Spatial Communications, Inc.
1001 Fourth Avenue Plaza, Suite 3200
Seattle, Washington 98154

Jerome K. Blask, Esq.
Coleen M. Egan, Esq.
Spatial Communications
c/o Gurman, Kurtis, Blask & Freedman
1400 16th Street, N.W., Suite 500
Washington, D.C. 20036

Henry M. Rivera, Esq.
Larry S. Solomon, Esq.
The Suite 12 Group
c/o Ginsburg, Feldman & Bress
1250 Conn. Ave, N.W., Suite 800
Washington, D.C. 20036

James E. Meyers, Esq.
Tele-Communications, Inc.
c/o Baraff, Koerner, Olender
& Hochbert, P.C.
5335 Wisconsin Ave., N.W, Suite 300
Washington, D.C. 20015

Raymond G. Bender, Jr., Esq.
Michael D. Basile, Esq.
Deborah R. Broughton, Esq.
TRX Transportation Telephone Co.
Dow, Lohnes & Albertson
1255 23rd Street, N.W.
Washington, D.C. 20037

Barbara C. Anderson, Esq.
Vice President and General Counsel
Executone Information Systems
6 Thorndal Circle
Darien, CT 06820

Leonard J. Baxt, Esq.
Leonard J. Kennedy, Esq.
Laura H. Phillips, Esq.
Personal Communications Service
c/o Dow, Lohnes & Albertson
1255 23rd Street, N.W.
Washington, D.C. 20037

Caressa D. Bennett, Esq.
Paramount Wireless Limited
Middle Georgia Personal Com. Inc.
Tri-Star Communications
c/o Kraskin & Associates
2120 L Street, N.W., Suite 810
Washington, D.C. 20037

Mr. Charles L. Davis
Vice President
Advanced Product Development
Protocol Systems Inc.
8500 SW Creekside Place
Beaverton, OR 97005

Russell H. Fox, Esq.
All Star Communications
Data & Voice of America
c/o Gardner, Carton & Douglas
1301 K Street, N.W., Suite 300 East Tower
Washington, D.C. 20005

William J. Franklin, Esq.
Wireless Communication Services
c/o Pepper & Corazzini
1776 K Street, N.W., Suite 200
Washington, D.C. 20006

Kenneth E. Hardman, P.C.
Advanced Tel., Inc.
Reserve Communications and Computer Corp.
1255 23rd Street, N.W., Suite 800
Washington, D.C. 20037-1170

John W. Hunter, Esq.
Rock Hill Telephone Co.
c/o McNair Law Firm, P.A.
1155 Fifteenth Street, N.W.
Washington, D.C. 20005

Daniel L. Bart, Esq.
GTE Service Corporation
1850 M Street, N.W., Suite 1200
Washington, D.C. 20036

Mr. J. Barclay Jones
Vice President, Engineering
American Personal Communications
1025 Connecticut Avenue, N.W.
Washington, D.C. 20036

Jonathan D. Blake, Esq.
Kurt A. Wimmer, Esq.
Ellen K. Snyder, Esq.
Thomas A. Robertson
Ronald J. Krotosynski, Jr., Esq.
American Personal Communications
c/o Covington & Burling
1201 Pennsylvania Avenue, N.W.
P.O. Box 7566
Washington, D.C. 20044

Randall B. Lowe, Esq.
John E. Hoover, Esq.
Litel Telecommunications Corp.
c/o Jones, Day Reavis & Pogue
1450 G Street, N.W.
Washington, D.C. 20005-2088

George Y. Wheeler, Esq.
American Portable Telecommunications, Inc.
c/o Koteen & Naftalin
1150 Connecticut Avenue, N. W., Suite 1000
Washington, D.C. 20036

Andrew D. Lipman, Esq.
Shelley L. Spencer, Esq.
Personal Communications Ntwk Svcs of New
York, Inc.
c/o Swidler & Berlin, Chartered
3000 K Street, N.W., Suite 300
Washington, D.C. 20007

Brenda L. Fox, Esq.
Leonard J. Kennedy, Esq.
Melissa Rogers, Esq.
Comcast PCS Communications, Inc.
c/o Dow Lohnes & Albertson
1255 23rd Street, N.W., Suite 500
Washington, D.C. 20037

Dennis R. Patrick
President & CEO
Lisa A. Hook
Chief Operating Officer
Time Warner Communications, Inc.
1776 Eye Street, N.W.
Washington, D.C. 20006

Charles D. Ferris, Esq.
Howard J. Symons
James A. Kirkland
Cablevision Systems Corp.
c/o Mintz, Levin, Cohn, Ferris, Glovsky
and Popeo, P.C.
701 Pennsylvania Avenue, N.W., Suite 900
Washington, D.C. 20004

William J. Free, Esq.
Mark P. Royer, Esq.
Southwestern Bell Personal Communications,
Inc.
One Bell Center, Room 3512
St. Louis, MO 63101-3099

Martin E. Grambow, Esq.
Southwestern Bell Personal Communications,
Inc.
1667 K Street, N.W., Suite 1000
Washington, D.C. 20006

Robert S. Foosaner, Esq.
Lawrence R. Krevor, Esq.
Fleet Call, Inc.
601 13th Street, N.W., Suite 1110 South
Washington, D.C. 20005

Jay E. Ricks, Esq.
Gardner F. Gillespie, Esq.
Joel S. Winnek, Esq.
PCN America, Inc.
c/o Hogan & Hartson
555 13th Street, N.W.
Washington, D.C. 20004

George H. Shapiro
Viacom International, inc.
c/o Arent, Fox, Kintner, Plotkin & Kahn
1050 Connecticut Avenue, N.W.
Washington, D.C. 20036-5339

Lawrence J. Movshin, Esq.
Wilkinson, Barker, Knauer & Quinn
1735 New York Avenue, N.W.
Suite 600
Washington, D.C. 20006

Richard McKenna
GTE Service Corporation
P.O. Box 152092
Irving, TX 75015-2092

Joan M. Griffin
GTE Service Corporation
1850 M Street, N.W., Suite 1200
Washington, D.C. 20036

Charles F. Wright
Centel Corporation
8725 Higgins Street
Chicago, IL 60631

Ivan G. Stiglitz, Leader
Advanced Techniques Group
Massachusetts Institute of Technology
Lincoln Laboratory
244 Wood Street
Lexington, MA 02173-9108

Larry A. Blosser
Donald J. Elardo
MCI Telecommunications Corp.
1801 Pennsylvania Avenue, N.W.
Washington, D.C. 20006

Tom Alberg, Executive Vice President
McCaw Cellular Communications, Inc.
5400 Carillon Point
Kirkland, WA 98033

John P. Bankson, Jr., Esq.
Joe D. Edge
Hopkins & Sutter
888 Sixteenth Street, N.W.
Washington D.C. 20006

Robert B. Kelly
Advanced Mobilecomm Technologies, Inc.
Digital Spread Spectrum Technologies, Inc.
1920 N Street, N.W., Suite 660
Washington, D.C. 20036

Winston E. Hinsworth
President
Tel / Logic, Inc.
51 Shore Drive
Plandome, NY 11030

Terrence P. McGarty
The Telemarc Group Inc., and Telemarc
Telecommunications, Co.
265 Franklin Street
Boston, MA 02110

David R. Siddall*
Office of Engineering and Technology
Federal Communications Commission
2025 M Street, N.W., Room 7102-A
Washington, D.C. 20554

Rodney Small*
Office of Engineering & Technology
Federal Communications Commission
2025 M Street, N.W., Room 7332
Washington, D.C. 20554

Thomas Derenge*
Office of Engineering & Technology
Federal Communications Commission
2025 M Street, N.W., Room 7332
Washington, D.C. 20554

Edward Schor
General Counsel / Communications
Viacom International, Inc.
1515 Broadway
New York, New York 10036

Margaret deB. Brown
Pacific Telesis Group
1818 N Street, N.W.
Washington, D.C. 20036


Albert Shuldiner